REMARKS

I. Introduction

Reconsideration of the application in view of the above amendments and the following remarks is respectfully requested. The subject Amendment is submitted in response to the Office Action mailed on February 12, 2004. At the time of the Office Action, claims 1-14 were pending in the Application. Applicants have amended claims 4-6 and 8-9 into independent format, canceled claim 7 without prejudice or disclaimer, and added new claims 15-17. No new matter has been added. Applicants note with appreciation the indication of allowable subject matter being recited by claims 4-6 and 8-9. As each of these claims has been rewritten into independent format, it is respectfully submitted that the claims are now in condition for allowance.

II. Objections To The Specification and The Claims

As set forth in paragraph 1-3 of the Office Action, the Examiner has objected the specification and the claims based on various informalities. In response, Applicants have amended both the specification and the claims so as to address the objections. It is respectfully submitted that the pending objections have been overcome in view of the foregoing amendments.

III. The Rejection of Claims 1-3 under 35 U.S.C. § 103

Claims 1-3 were rejected under 35 U.S.C. § 103 as being unpatentable over Applicants' admitted prior art ("AAPA") in view of U.S. Patent No. 6,631,171 to Kawai. The Examiner admits that AAPA does not disclose an operation-starting point of said variable gain amplifier is

shifted using the control voltages and therefore relies on the teachings of Kawai to modify the structure of AAPA so as to reach the claimed invention. It is respectfully submitted that claim 1, as amended, is patentable over the combination of the cited prior art.

Claim 1, as amended, recites in-part a control voltage generator for generating control voltages for controlling said variable gain amplifiers based on an output of said **loop filter** wherein an **operation-starting point** of said variable gain amplifier **is shifted using the control voltages** when a level fluctuation response speed of any of said variable gain amplifiers is **lower** than a reference level. Accordingly, when an input signal whose level fluctuates is detected, the microprocessor controls the control voltage generator such that the gain attenuation of the variable gain amplifiers maybe adjusted in accordance with the fluctuation. For example, at an input level of -30 dBm (see, e.g., 27 of Fig. 2B), the conversion gain is 100 dB/V, which is poor as compared with other input levels, and hence the level fluctuation response speed is also poor at 40 Hz. Since the operation-starting point of variable gain amplifier 2, i.e. -70 dBm, is known, the present input level can be calculated by microprocessor from the control voltages for variable gain amplifiers 2 and 4. When detecting the input level of -30 dBm, microprocessor controls the control voltage generator to shift the operation-starting point of the variable gain amplifier 4 to -60 dBm. As a result, at the input level of -30dBm, the operation point corresponding to the control voltage of variable gain amplifier 2 shifts from A32 to B32, as shown in Fig. 3A. The conversion gain hence increases to 180 dB/V as shown in Fig. 3B, and level fluctuation response speed 36 is improved to 60 Hz. Thus, a favorable level-fluctuation characteristic is obtained regardless of the input level (page 7, line 18-page 8, line 14).

Turning to the cited prior art, Kawai teaches providing a receiving unit in which phase noise of a local oscillation signal is not increased even when a QPSK modulation signal having a low bit rate is supplied. In particular, in order to solve the problem of increasing bit error and deteriorating picture quality, Kawai provides a first level and a second level changing level means for receiving the signals, changing the signals' level, and outputting resultant QPSK modulation signals. A first and second intermediate frequency, resulting from mixing the modulations signals by the mixer, are demodulated, wherein reduction in output level of the IQ demodulator starts when the QPSK modulation signal is at the first level, reduction in output level of the first level changing means starts when the QPSK modulation is at the second level higher than the first level, and reduction in output level of the second level changing means starts when the QPSK modulation is at the third level higher than the second level (Col. 2, line 56-Col. 3, line 19).

Thus, Kawai discloses that the automatic gain control voltage V_{age} generated by the QPSK demodulator is supplied to the variable gain amplifier, the variable attenuator and the IQ demodulator. As a result, Kawai fails to disclose **generating control voltages based on an output of said loop filter**. As such, Kawai also fails to disclose or suggest that an operation-starting point of the variable gain amplifiers is shifted **using the control voltages based on the output of loop filter**, when a **level fluctuation response speed of the variable gain amplifiers is lower than a reference level**, as recited by claim 1.

Thus, as each and every claim element must be disclosed or suggested by the combination of prior art references in order to establish a *prima facie* case of obviousness (see, **M.P.E.P. § 2143.03**), and the combination of the AAPA and Kawai fail to do so, it is submitted that claims 1-3 are patentable over AAPA in view of Kawai.

Furthermore, the Examiner is directed to **M.P.E.P. § 2143.03** under the subsection entitled "Fact that References Can Be Combined or Modified is Not Sufficient to Establish *Prima Facie* Obviousness", which sets forth the applicable standard:

> The mere fact that references **can** be combined or modified does not render the resultant combination obvious unless the prior art also suggests the **desirability** of the combination. (*In re Mills*, 16 USPQ2d 1430 (Fed. Cir. 1990)).

In the instant case, it is respectfully submitted that the relied on motivation for modifying AAPA with the teachings of Kawai is improper. The Examiner's motivation for making the proposed combination is "so that the level of the QPSK modulation signal differs when the gain is changed or the attenuation is started in the variable gain amplifier, the variable attenuator, and the IQ demodulator." However, this purported benefit of Kawai is not attributable or related to the AAPA.

Specifically, the AAPA is directed to a conventional digital signal receiver where a generator controls the gains of variable gain amplifiers so that the input level converter maybe constant. In particular, before synchronism is achieved prior to demodulation, the filter bandwidth of loop filter is broadened and the receiver responds to signal fluctuations at high speed. After the synchronism is established by narrowing the filter bandwidth and noise bandwidth, the noise characteristic after the synchronization is improved (page 2, lines 1-9).

Kawai, on the other hand, is directed to providing a receiving unit in which phase noise of a local oscillation signal is not increased when a QPSK modulation signal having a low bit rate is supplied. Specifically, Kawai is concerned that the QPSK modulation signal supplied to the mixer is leaked to the local oscillator and the operation of the local oscillator consequently becomes unstable due to the leaked QPSK modulation signal, and hence the phase noise of the

local oscillation signal increases. As such, the alleged motivation to combine the AAPA with Kawai so that "the level of the QPSK modulation signal differs when the gain is changed or the attenuation is started in the variable gain amplifier, the variable attenuator, and the IQ demodulator" is improper since AAPA does not utilize a variable attenuator nor an IQ demodulator nor is Kawai analogous to the art of the AAPA.

Therefore, the alleged motivation does not provide one of ordinary skill in the art with any reason to generate control voltages based on an output of the loop filters and shift the operation-starting point of the variable gain amplifiers when a level response speed of these amplifiers is lower than a reference level to arrive the claimed subject matter.

For all of the foregoing reasons, it is respectfully submitted that claims 1-3 are patentable over the combination of AAPA and Kawai.

IV. The Rejection Of Claim 10 under 35 U.S.C. § 103

Claim 10 is rejected under 35 U.S.C § 103 as being unpatentable over the AAPA in view of U.S. Patent No. 6,643,321 to Genossar. For the following reasons, it is respectfully submitted that claim 10 is patentable over the combination of cited prior art.

The Examiner admits that the AAPA does not teach a ghost detector comprising a delay unit, a ghost calculator, a coefficient unit and an averaging unit for calculating a coefficient of said coefficient unit wherein a number of times of averaging at said averaging unit is controlled based on the delay time, and therefore relies on the teachings of Genossar to modify the ghost detector of AAPA so as to reach the claimed invention. Applicants respectfully traverse the rejection for the following reasons.

The Examiner is again directed to **M.P.E.P. § 2143.03** under the section entitled "All Claim Limitations Must Be Taught or Suggested", which sets forth the applicable standard:

> To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. (citing *In re Royka*, 180 USPQ 580 (CCPA 1974)).

In the instant case, the pending rejection does not "establish *prima facie* obviousness of [the] claimed invention" as recited in claim 10 because the proposed combination fails the "all the claim limitations" standard required under 35 U.S.C. § 103. In particular, the AAPA fails to recite a ghost calculator **for calculating the delay time and an energy of ghost**, and Genossar fails to recite a coefficient unit **where its coefficient is determined by the averaging unit**, and an **averaging unit for calculating a coefficient of said coefficient unit** wherein a number of times of averaging at said **averaging unit is controlled based on the delay time**.

Specifically, it is respectfully submitted that the Examiner's conclusion of obviousness is based on improper hindsight reasoning. *In re McLaughlin 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971)*. In particular, the AAPA does not teach that the ghost calculator **calculates the delay time and the energy of ghost**. It appears that the Examiner includes the knowledge of the ghost calculator gleaned from Applicants' disclosure to reconstruct the claimed subject matter. Therefore, the pending rejection in accordance with the combination of AAPA and Genossar is improper and the combination of the AAPA and Genossar fails to disclose all limitations as is required under 35 U.S.C. § 103.

Furthermore, it is respectfully submitted that Genossar does not disclose **a ghost calculator for calculating the delay time and an energy of ghost** and **an averaging unit for calculating a coefficient unit**. Nowhere in Genossar does it teach any ghost calculator and an

averaging unit for performing the claimed limitations. As noted in Genossar, the equalizer controller uses the received training sequence to update the coefficients of equalizer by using an algorithm such as LMS (least means square) to attempt to converge the equalizer coefficient to the optimal values (Col. 11, lines 7-27) so that the equalizer can process the digital signal in order to compensate for intersymbol interference.

In contrast, the present invention is directed to utilizing an equalizer as a ghost detector. In particular, when the signal containing the ghost generated in the transmission line is put into the equalizer, the delay time and energy of ghost are calculated in least mean square algorithm unit, which is a ghost calculator, and averaged in the averaging unit and coefficient of coefficient unit. By employing a digital filter composed of the delay unit, a coefficient unit and adder, a distortion due to ghost signal is corrected.

Accordingly, at least for the foregoing reasons, claim 10 is patentably distinct over the combination of the AAPA and Genossar, and withdrawal of the pending rejection is respectfully requested.

V. The Rejection Of Claim 11 under 35 U.S.C. § 103

Claim 11 is rejected under 35 U.S.C § 103 as being unpatentable over the AAPA in view of U.S. Patent No. 4,355,304 to Kasuga. For the following reasons, it is respectfully submitted that claim 11 is patentable over the combination of cited prior art.

The Examiner admits that the AAPA does not disclose or suggest that an operation-starting point of said variable gain amplifier is shifted based on the delay time, and therefore

relies on the teachings of Kasuga to modify the digital signal receiver of the AAPA so as to arrive at the claimed subject matter. However, the Applicants respectfully traverse the rejection.

Specifically, as discussed above, the AAPA does not disclose a ghost detector coupled to an output of said demodulator for calculating a delay time of ghost. It appears that the Examiner includes the knowledge of the ghost detector and equalizer gleaned from Applicants' disclosure to reconstruct the claimed subject matter. Therefore, the pending rejection in accordance with the combination of AAPA and Kasuga is improper and the combination of AAPA in view of Kasuga fails to disclose all limitations as is required under 35 U.S.C. § 103.

Furthermore, the Examiner asserts that Kasuga discloses a device in which the operation-starting point of said variable gain amplifier is shifted based on the delay time. However, the Examiner overlooks that the expected signal generating circuit of Kasuga is a circuit which generates an expected signal corresponding to the analog conversion level of the incoming digital modulated signal by a sampling period. The digital modulated signal supplied from the expected signal generating circuit and the gain control circuit to the variable gain circuit is thereby varied of its analog conversion level by a control signal supplied (Col. 4, lines 2-38). Accordingly, the expected signal generating circuit is of a certain type of finite impulse response (FIR) digital filter. Thus, Kasuga discloses that a **gain of variable gain circuit is controlled based on the output of expected signal generating circuit**.

In contrast, in accordance with the present invention, **the operation-starting point of the variable gain amplifiers is shifted based on the delay time**. Specifically, as shown in Fig. 10A, when a signal is received with an indoor antenna, the signal is reflected in a narrow environment of a room, and hence causing much ghost in a short delay time of 100 nsec or less. To solve this prior art problem, the operation-starting point is shifted such the averaging unit is

set so as to be suited to each receiving environment. For example, if a significant ghost exists within the delay time of 100 nsec, the number of times of averaging at averaging unit is decreased, causing the operation-starting point to be shifted so as to improve the follow-up performance. On the other hand, if there is no significant ghost within the delay time of 100 nsec, the number of times of averaging is increased, causing a shift of the operation-starting point, and the influence of a noise is reduced and the stability is also improved.

For at least the foregoing reasons, it is respectfully submitted that Kasuga does not disclose or suggest an operation-starting point of the variable gain amplifier being shifted based on the delay time.

It is also noted that new claim 15 recites a control voltage generator for generating a control voltage for controlling the variable gain amplifiers from an output of the loop filter. Neither of the cited prior art references discloses this limitation. Accordingly, for at least the foregoing reasons, new claim 15 is patentable over the cited prior art.

VI. The Rejection of Claim 12 under 35 U.S.C. § 103

Claim 12 is rejected under 35 U.S.C § 103 as being unpatentable over the AAPA in view of U.S. Patent No. 5,375,145 to Abbott. For the following reasons, it is respectfully submitted that claim 12 is patentable over the combination of cited prior art.

As discussed above, the AAPA does not disclose a device having a ghost detector coupled to an output of said demodulator for calculating a delay time of ghost. It appears that the Examiner includes the knowledge of the ghost detector and equalizer gleaned from Applicants' disclosure to reconstruct the claimed subject matter. Therefore, the pending rejection in

accordance with the combination of AAPA and Abbott is improper as the combination fails to disclose all recited claim elements, as is required under 35 U.S.C. § 103.

Moreover, in accordance with the present invention, the microprocessor broadens or narrows the bandwidth of the loop filter, and sets the fluctuation response characteristic based on the delay time. The foregoing process allows the device to realize higher response speed while maintaining favorable stability and noise characteristics (page 10, lines 1-21).

Turning to the pending rejection, it is admitted that the AAPA does not disclose a device wherein a bandwidth of the loop filter is controlled based on the delay time. Abbott is relied upon as curing the defects of the AAPA.

However, in contrast to the device of the present invention, Abbott only discloses a digital loop filter that eliminates errors otherwise due to bias and offset that may exist in an analog-only loop filter implementation, and loop compensation or bandwidth maybe easily adjusted simply by loading registers, or by switching between banks of registers (Col. 13, lines 27-39). It is not found in Abbott that **the bandwidth of the loop filter is controlled based on the delay time**, wherein the delay time is calculated by the ghost detector. It is submitted that the FIR filter, gain error estimator and digital loop filter of Abbott do not output a delay time signal, but rather a filtered signal.

Thus, as each and every limitation must be either disclosed or suggested by the cited prior art in order to establish a prima facie case of obviousness, and the combination of the AAPA and Abbott fails to do so, it is respectfully submitted that claim 12 is patentable over the cited prior art.

Moreover, it is only in Applicants' disclosure that discloses the foregoing controlling the bandwidth based on the delay time. Neither the AAPA nor Abbott describe or suggest such step.

Thus, the only motivation of record for the proposed modification of the structure of the prior art to arrive at the claimed invention is found in Applicants' disclosure which, of course, may not properly be relied upon to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103.

For all of the foregoing reasons, Applicants respectfully submit that claim 12 is patentable over the cited prior art.

VII. The Rejection Of Claim 13 under 35 U.S.C. § 103

Claim 13 is rejected under 35 U.S.C. § 103 as being unpatentable over AAPA in view of U.S. Patent No. 6,032,031 to Takaki. For the following reasons, it is respectfully submitted that claim 13 is patentable over the combination of cited prior art.

In accordance with the present invention, the carrier-to-noise (CN) ratio detector detects the electric power ratio of a signal and a noise of the input signal into the A/D converter and the microprocessor sets **the operation-starting point of variable gain amplifier on the basis of the detected CN ratio**. As a result, the required CN ratio is maintained and the adjacent interference ratio can be guaranteed (page 17, line 11-page 8, line 1).

Turning to the prior art, the Examiner acknowledges that the AAPA does not disclose a CN ratio detector coupled to the output of a A/D converter, wherein an operation-starting point of said variable gain amplifier is shifted based on the CN ratio. Takaki is relied upon as curing this deficiency of the AAPA.

However, in contrast to the digital signal receiver of the present invention, Takaki only discloses an error ration calculation means for calculating **bit error** ratio of the demodulated digital signal, and a gain control quantity control unit which controls the **gain** quantity of the first variable gain unit (Col. 6, lines 46-50). Nowhere in Takaki does it teach a **carrier-to-noise** ratio detector wherein the operation-starting point of variable gain unit is **shifted based on the CN ratio**.

Thus, as each and every limitation must be either disclosed or suggested by the cited prior art in order to establish a prima facie case of obviousness, and the combination of the AAPA and Takaki fails to do so, it is respectfully submitted that claim 13 is patentable over the cited prior art.

It should also be recognized that the fact the prior art could be modified so as to result in the combination defined by the claims at bar would not have made the modification obvious unless the prior art suggests the desirability of the modification. *In re Deminski, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986).*

Moreover, recognizing after the fact that such a modification would provide an improvement or advantage, without suggestion thereof by the prior art, rather than dictating a conclusion of obviousness, is an indication of improper application of hindsight considerations. Simplicity and hindsight are not proper criteria for resolving obviousness. *In re Warner, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967).*

Thus, the only motivation of record for the proposed modification of the structure of the prior art to arrive at the claimed invention is found in Applicants' disclosure which, of course, may not properly be relied upon to support the ultimate legal conclusion of obviousness under 35

U.S.C. § 103. *Panduit Corp. vs. Dennison Mfg. Co., 810 F.2d 1561, 227 1 USPQ2d 1593 (Fed. Cir. 1987).*

For all of the foregoing reasons, Applicants respectfully submit that claim 13 is patentable over the cited prior art.

It is noted that neither of the cited prior art references disclose the limitation in new claim 16. Accordingly, for at least this reason, new claim 16 is patentable over the cited prior art.

VIII. The Rejection of Claim 14 under 35 U.S.C. § 103

Claim 14 is rejected under 35 U.S.C. § 103 as being unpatentable over AAPA in view of Takaki and Abbott. For the following reasons, it is respectfully submitted that claim 14 is patentable over the combination of cited prior art.

In accordance with the present invention, the carrier-to-noise (CN) ratio detector detects the CN ratio and transmits the detected signal to microprocessor. Depending on the required CN ratio, the bandwidth of the loop filter is controlled based on the CN ratio via microprocessor, as shown in Fig. 11.

Turning to the prior art, the Examiner acknowledges that the AAPA in view of Takaki does not disclose that the bandwidth of the loop filter is controlled based on the CN ratio. Abbott is relied upon as curing these deficiencies of the AAPA.

However, in contrast to the digital signal receiver of the present invention, Abbott only discloses receiving gain error values from the acquisition mode gain quantization circuit and from the tracking mode gain quantization circuit. These circuits receive program values from the register file which sets gain error estimation values for use with a two-level reference, and the

gain loop bandwidth to **a wide level during acquisition** or to a **narrower level during tracking**, so as to provide greater loop stability and immunity to noise artifacts (Col. 13, lines 13-35). It should be recognized that the method as claimed by Takkai in view of Abbott is fundamentally different from the digital signal receiver as claimed. In particular, acquisition and tracking mode are non-analogous art to the claimed subject matter. Nowhere is there any acquisition mode or tracking mode utilized in the present invention. Furthermore, the loop bandwidth is adjusted by loading registers or switching **between banks of register**, rather than **on the basis of the carrier-to-noise ratio**.

Thus, as each and every limitation must be either disclosed or suggested by the cited prior art in order to establish a prima facie case of obviousness, and the combination of the AAPA and Takkai in view of Abbott fails to do so, it is respectfully submitted that claim 14 is patentable over the cited prior art.

It is noted that neither of the cited prior art references disclose the limitation in new claim 17. Accordingly, for at least this reason, new claim 17 is patentable over the cited prior art.

IX. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, ***Hartness International Inc. v. Simplimatic Engineering Co.***, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 6 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

X. Request For Notice Of Allowance

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. Favorable consideration is respectfully requested.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that Applicant has inadvertently overlooked the need for a petition for extension of time. The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0417.

Respectfully submitted,

MCDERMOTT, WILL & EMERY

Michael E. Fogarty
Registration No. 36,139

600 13th Street, N.W.
Washington, DC 20005-3096
(202) 756-8000 MEF:AHC
Facsimile: (202) 756-8087
Date: April 23, 2004